



TEST REPORT 2221544-AGK

Date 21 MAR 2022

Singapore Test Lab Pte Ltd, 10B Enterprise Road, Singapore 629828, Tel: +65 6353 6393, Fax: +65 6353 6395

SUBJECT:

Batch testing of full body harness incorporated with energy absorber restraining line sampled by Singapore Test Lab officer at Rectitude Pte Ltd premises on 11 March 2022.

TESTED FOR:

Rectitude Pte Ltd
35 Tampines Industrial Ave 5,
T5 @ Tampines,
Singapore 528627

DATE OF TEST:

15 March 2022 to 21 March 2022

METHOD OF TEST:

SS 528: Part 1: 2006 (2014) Specification for Personal fall-arrest systems
Part 1 – Full-body harnesses

SS 528: Part 2: 2006 (2014) Specification for Personal fall-arrest systems
Part 2 – Lanyards and energy absorbers

SS 528: Part 5: 2006 (2014) Specification for Personal fall-arrest systems
Part 5 – Connectors with self-closing and self-locking gates

SS 528: Part 6: 2006 (2014) Specification for Personal fall-arrest systems
Part 6 – System performance tests

Configuration of Personal Fall Arrest System (PFAS)

- A + EAL +FBH



The results reported herein have been performed in accordance with the laboratory's terms of accreditation under the Singapore Accreditation Council – Singapore Laboratory Accreditation Scheme.

Terms and conditions:

1. This report applies to the sample of the specific product given at the time of its testing. The results are not used to indicate or imply that they are applicable to other similar items. This report may not be used to indicate or imply that Singapore Test Lab endorses, approves or recommends the tested sample.
2. Singapore Test Lab shall under no circumstances be liable to the client in contract or otherwise for any direct or indirect loss or damage suffered by the client howsoever arising or whether connected with the services provided herein.
3. Singapore Test Lab assumes no responsibility for the accuracy of information and/or details of the samples as supplied by the client.
4. This report shall not be reproduced in part or in full and shall not be used in any publicity material without the written permission of Singapore Test Lab.
5. The tests were carried out at Singapore Test Lab unless otherwise stated.



Singapore Test Lab is an ISO / IEC 17025 Accredited Laboratory.



SAMPLE DESCRIPTION:

Full body harness

40 pieces of full body harness with dorsal anchorage point with 3 points buckles were randomly sampled from a consignment of 4000 pieces.

Brand / model: SkyHawk / SK08 & SK08A
Classification: Class A (for fall arrest purposes)
Primary strap: 44 mm width

Energy absorbing lanyard (double)

30 pieces of energy-absorbing lanyard (1.75m nominal length) were randomly sampled from a consignment of 3000 pieces

Energy absorbing lanyard (13 mm diameter rope-based lanyard)

Brand / model: SkyHawk / SK02K & SK02KA
Type: 2 (used in PFAS where the potential freefall distance limited to a maximum of 4 m)

Number of lanyards: Two

Energy absorber: SkyHawk / SK02K & SK02KA

Rope lanyard: SkyHawk / SK09
Steel snap hook: SkyHawk / SK05 (54 mm Gate opening) & SK05A (56 mm Gate opening)
Steel karabiner: SkyHawk / SK06 (20 mm Gate opening)

Terms and conditions:

1. The result in this report applies to the sample as received from the client at the time of its testing. The result is not intended to be representative of other similar or equivalent sample. This report may not be used to indicate or imply that Singapore Test Lab endorse the test sample mentioned.
2. Singapore Test Lab shall under no circumstances be liable to the client in contract or otherwise for any direct or indirect loss or damage suffered by the client howsoever arising or whether connected with the services provided herein.
3. Singapore Test Lab assumes no responsibility for the accuracy of information and/or details of the samples as supplied by the client.
4. This report shall not be reproduced in part or in full and shall not be used in any publicity material without the written permission of Singapore Test Lab.
5. The tests were carried out at Singapore Test Lab unless otherwise stated.



TEST REPORT 2221544-AGK

Date 21 MAR 2022

Singapore Test Lab Pte Ltd, 10B Enterprise Road, Singapore 629828, Tel: +65 6353 6393, Fax: +65 6353 6395

TEST RESULTS:

Table 1: SS528: Part 1: 2006 (2014) – (Full-body harnesses)

Clause	Results	SS 528: Part 1: 2006 (2014) Requirements
<p>5.7.1 Feet first test The full body harness fitted to the 100 kg torso test mass is allowed to fall freely over a distance of 1.0 m.</p>	<p>Complied</p>	<p>4.7 Dynamic performance The full body harness shall retain the torso test mass clear of the ground and in an upright position when tested at each fall-arrest attachment element.</p> <p>In addition, there shall be:</p> <ul style="list-style-type: none"> a) No tearing of webbing material b) No tearing of any primary strap sewn joint c) No partial or complete fracture of any buckle d) No inadvertent opening of any fastening buckle <p>At the conclusion of the test the angle formed between the back of the torso test mass and the test lanyard shall not exceed 45°.</p> <p>The full body harness shall be capable of retaining the torso test mass in post-dynamic test suspension for a period of at least 10 min.</p>

Terms and conditions:

1. The result in this report applies to the sample as received from the client at the time of its testing. The result is not intended to be representative of other similar or equivalent sample. This report may not be used to indicate or imply that Singapore Test Lab endorse the test sample mentioned.
2. Singapore Test Lab shall under no circumstances be liable to the client in contract or otherwise for any direct or indirect loss or damage suffered by the client howsoever arising or whether connected with the services provided herein.
3. Singapore Test Lab assumes no responsibility for the accuracy of information and/or details of the samples as supplied by the client.
4. This report shall not be reproduced in part or in full and shall not be used in any publicity material without the written permission of Singapore Test Lab.
5. The tests were carried out at Singapore Test Lab unless otherwise stated.



TEST REPORT 2221544-AGK

Date 21 MAR 2022

Singapore Test Lab Pte Ltd, 10B Enterprise Road, Singapore 629828, Tel: +65 6353 6393, Fax: +65 6353 6395

TEST RESULTS (CON'T):

Table 2: SS528: Part 1: 2006 (2014) – (Full-body harnesses)

Clause	Results	SS 528: Part 1: 2006 (2014) Requirements
<p>5.7.2 Head first test The full body harness fitted to the 100 kg torso test mass is allowed to fall freely over a distance of 1.0 m.</p>	<p>Complied</p>	<p>4.7 Dynamic performance The full body harness shall retain the torso test mass clear of the ground and in an upright position when tested at each fall-arrest attachment element.</p> <p>In addition, there shall be:</p> <ul style="list-style-type: none"> a) No tearing of webbing material b) No tearing of any primary strap sewn joint c) No partial or complete fracture of any buckle d) No inadvertent opening of any fastening buckle <p>At the conclusion of the test the angle formed between the back of the torso test mass and the test lanyard shall not exceed 45°.</p> <p>The full body harness shall be capable of retaining the torso test mass in post-dynamic test suspension for a period of at least 10 min.</p>

Terms and conditions:

1. The result in this report applies to the sample as received from the client at the time of its testing. The result is not intended to be representative of other similar or equivalent sample. This report may not be used to indicate or imply that Singapore Test Lab endorse the test sample mentioned.
2. Singapore Test Lab shall under no circumstances be liable to the client in contract or otherwise for any direct or indirect loss or damage suffered by the client howsoever arising or whether connected with the services provided herein.
3. Singapore Test Lab assumes no responsibility for the accuracy of information and/or details of the samples as supplied by the client.
4. This report shall not be reproduced in part or in full and shall not be used in any publicity material without the written permission of Singapore Test Lab.
5. The tests were carried out at Singapore Test Lab unless otherwise stated.

TEST RESULTS (CON'T):

Table 3: SS528: Part 2: 2006 (2014) – (Lanyards and energy absorbers)

Clause	Results	SS 528: Part 2: 2006 (2014) Requirements
<p><u>5.3.4 Dynamic test of energy absorbing lanyard</u> The 100 kg test mass of steel is allowed to fall freely over a distance of 4 m.</p>	Complied	<p><u>4.3.5 Energy absorber (Type 2)– Dynamic performance</u> An energy absorber shall limit the arrest force to a maximum of 6 kN.</p> <p>Permanent extension of the energy absorber shall not exceed 1.75 m.</p>

Table 4: SS528: Part 5: 2006 (2014) - (Connectors with self-closing and self-locking gates)

Clause	Results	SS 528: Part 5: 2006 (2014) Requirements
<p><u>Clause 5.2 Static strength test</u> Applied a minimum force of 20 kN and maintained it for 60 sec.</p>	Complied	<p><u>4.3 Static strength test</u> The connector shall withstand a minimum force of 20 kN for 60 sec. There shall be no partial fractures or inadvertent opening of the gate.</p>

Terms and conditions:

1. The result in this report applies to the sample as received from the client at the time of its testing. The result is not intended to be representative of other similar or equivalent sample. This report may not be used to indicate or imply that Singapore Test Lab endorse the test sample mentioned.
2. Singapore Test Lab shall under no circumstances be liable to the client in contract or otherwise for any direct or indirect loss or damage suffered by the client howsoever arising or whether connected with the services provided herein.
3. Singapore Test Lab assumes no responsibility for the accuracy of information and/or details of the samples as supplied by the client.
4. This report shall not be reproduced in part or in full and shall not be used in any publicity material without the written permission of Singapore Test Lab.
5. The tests were carried out at Singapore Test Lab unless otherwise stated.



TEST REPORT 2221544-AGK

Date 21 MAR 2022

Singapore Test Lab Pte Ltd, 10B Enterprise Road, Singapore 629828, Tel: +65 6353 6393, Fax: +65 6353 6395

TEST RESULTS (CON'T):

Table 5: SS528: Part 6: 2006 (2014) - (System performance tests)

Clause	Results	SS 528: Part 6: 2006 (2014) Requirements
<p>6.2 Performance test for A + EAL + FBH type PFAS</p> <p>a. 100 kg torso test mass</p> <p>b. 1.8 m free fall distance</p>	<p>Complied</p>	<p>5.2 System performance</p> <p>The arrest force shall not exceed 6kN.</p> <p>The angle formed between the back of the torso test mass and the vertical plane shall not exceed 45°.</p> <p>With the 100 kg torso test mass remaining in post-drop suspension, there shall be none of the following results on a full body harness:</p> <ul style="list-style-type: none"> a. Tearing of webbing material b. Tearing of any primary strap sewn joint c. Partial or complete fracture of any fastening or adjusting buckle d. Inadvertent opening of any fastening buckle e. Straps applying pressure to the neck of the torso test mass. <p>With the torso test mass remaining in post-drop suspension, there shall be neither of the following results on other parts of the PFAS:</p> <ul style="list-style-type: none"> a. Tearing or rupture of any component (except where such tearing was deliberately designed to contribute to energy dissipation) b. Partial fractures or inadvertent opening of connector gates.

Terms and conditions:

1. The result in this report applies to the sample as received from the client at the time of its testing. The result is not intended to be representative of other similar or equivalent sample. This report may not be used to indicate or imply that Singapore Test Lab endorse the test sample mentioned.
2. Singapore Test Lab shall under no circumstances be liable to the client in contract or otherwise for any direct or indirect loss or damage suffered by the client howsoever arising or whether connected with the services provided herein.
3. Singapore Test Lab assumes no responsibility for the accuracy of information and/or details of the samples as supplied by the client.
4. This report shall not be reproduced in part or in full and shall not be used in any publicity material without the written permission of Singapore Test Lab.
5. The tests were carried out at Singapore Test Lab unless otherwise stated.



TEST REPORT 2221544-AGK

Date 21 MAR 2022

Singapore Test Lab Pte Ltd, 10B Enterprise Road, Singapore 629828, Tel: +65 6353 6393, Fax: +65 6353 6395


TEST RESULTS (CON'T):

Table 6: SS528: Part 1 & Part 5: 2006 (2014) - (Corrosion resistance)

Clause	Sample Reference	Results	SS 528: Part 1 & Part 5: 2006 (2014) Requirements
5.2 Corrosion test (SS528: Part 1) Salt sprayed test the connector in accordance with ISO 9227, with an initial exposure of 24 h, followed by 1 h of drying, followed by a second exposure of 24 h.	D-ring	Complied	Clause 4.4 Corrosion resistance All metallic fittings shall be free of red rust, as visible to the unaided eye, or other evidence of corrosion of the base metal.
	Buckle	Complied	
5.3 Corrosion test (SS528: Part 5) Salt sprayed test the connector in accordance with ISO 9227, with an initial exposure of 24 h, followed by 1 h of drying, followed by a second exposure of 24 h.	Snap hook (54 mm Gate opening)	Complied	Clause 4.4 Corrosion resistance When tested, the connector gate shall continue to function. There shall be no evidence of corrosion of the base metal.
	Karabiner (20 mm Gate opening)	Complied	

REMARKS:

- Based on the test results, in accordance with the requirements of the following Singapore Standards, the samples taken from the consignment passed the established rejection-acceptance criteria:
 - SS 528: Part 1: 2006 (2014)
 - SS 528: Part 2: 2006 (2014)
 - SS 528: Part 5: 2006 (2014)
 - SS 528: Part 6: 2006 (2014)
- A total of 6930 nos. of SINGAPORE TEST LAB Batch tested labels, comprising BTF-0018519 to BTF-0025448 were issued to the above consignment of full body harness incorporated with energy-absorbing lanyard.


 Sam Au
 Testing Officer


 Chua Peck Cheong
 Senior Manager

Terms and conditions:

- The result in this report applies to the sample as received from the client at the time of its testing. The result is not intended to be representative of other similar or equivalent sample. This report may not be used to indicate or imply that Singapore Test Lab endorse the test sample mentioned.
- Singapore Test Lab shall under no circumstances be liable to the client in contract or otherwise for any direct or indirect loss or damage suffered by the client howsoever arising or whether connected with the services provided herein.
- Singapore Test Lab assumes no responsibility for the accuracy of information and/or details of the samples as supplied by the client.
- This report shall not be reproduced in part or in full and shall not be used in any publicity material without the written permission of Singapore Test Lab.
- The tests were carried out at Singapore Test Lab unless otherwise stated.

APPENDIX:

Photo 1: Full body harness, SK08

Terms and conditions:

1. The result in this report applies to the sample as received from the client at the time of its testing. The result is not intended to be representative of other similar or equivalent sample. This report may not be used to indicate or imply that Singapore Test Lab endorse the test sample mentioned.
2. Singapore Test Lab shall under no circumstances be liable to the client in contract or otherwise for any direct or indirect loss or damage suffered by the client howsoever arising or whether connected with the services provided herein.
3. Singapore Test Lab assumes no responsibility for the accuracy of information and/or details of the samples as supplied by the client.
4. This report shall not be reproduced in part or in full and shall not be used in any publicity material without the written permission of Singapore Test Lab.
5. The tests were carried out at Singapore Test Lab unless otherwise stated.

APPENDIX (CON'T):



Photo 2: Full body harness, SK08A

Terms and conditions:

1. The result in this report applies to the sample as received from the client at the time of its testing. The result is not intended to be representative of other similar or equivalent sample. This report may not be used to indicate or imply that Singapore Test Lab endorse the test sample mentioned.
2. Singapore Test Lab shall under no circumstances be liable to the client in contract or otherwise for any direct or indirect loss or damage suffered by the client howsoever arising or whether connected with the services provided herein.
3. Singapore Test Lab assumes no responsibility for the accuracy of information and/or details of the samples as supplied by the client.
4. This report shall not be reproduced in part or in full and shall not be used in any publicity material without the written permission of Singapore Test Lab.
5. The tests were carried out at Singapore Test Lab unless otherwise stated.

APPENDIX (CON'T):



Photo 3: Energy-absorbing lanyard, SK02K

Terms and conditions:

1. The result in this report applies to the sample as received from the client at the time of its testing. The result is not intended to be representative of other similar or equivalent sample. This report may not be used to indicate or imply that Singapore Test Lab endorse the test sample mentioned.
2. Singapore Test Lab shall under no circumstances be liable to the client in contract or otherwise for any direct or indirect loss or damage suffered by the client howsoever arising or whether connected with the services provided herein.
3. Singapore Test Lab assumes no responsibility for the accuracy of information and/or details of the samples as supplied by the client.
4. This report shall not be reproduced in part or in full and shall not be used in any publicity material without the written permission of Singapore Test Lab.
5. The tests were carried out at Singapore Test Lab unless otherwise stated.

APPENDIX (CON'T):

Photo 4: Energy-absorbing lanyard, SK02KA

Terms and conditions:

1. The result in this report applies to the sample as received from the client at the time of its testing. The result is not intended to be representative of other similar or equivalent sample. This report may not be used to indicate or imply that Singapore Test Lab endorse the test sample mentioned.
2. Singapore Test Lab shall under no circumstances be liable to the client in contract or otherwise for any direct or indirect loss or damage suffered by the client howsoever arising or whether connected with the services provided herein.
3. Singapore Test Lab assumes no responsibility for the accuracy of information and/or details of the samples as supplied by the client.
4. This report shall not be reproduced in part or in full and shall not be used in any publicity material without the written permission of Singapore Test Lab.
5. The tests were carried out at Singapore Test Lab unless otherwise stated.